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A New Species of Centrolophid Fish from Easter Island and Rapa Iti Island in the South Pacific

Don E. McAllister and John E. Randall

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Summary

Four specimens from the marine shore waters of Easter Island (Isla de Pascua) and Rapa Iti Island in the South Pacific Ocean are referred to the genus *Schedophilus* and described as a new species, *Schedophilus* ***labyrinthicus.*** The holotype is deposited in the National Museum of Natural Sciences, Ottawa.

Résumé

Quatre spécimens provenant des eaux côtières de l'île de Pâques (Isla de Pascua) et de l'île de Rapa Iti, dans le sud de l'océan Pacifique, et se rattachant au genre *Schedophilus* ont servi à décrire une nouvelle espèce, *Schedophilus* ***labyrinthicus***. L'holotype est déposé au Musée national des Sciences naturelles, à Ottawa.

Resumen

Se describen cuatro ejemplares procedentes de las aguas marítimas de la Isla de Pascua y de la Isla de Rapa Iti, en el Sur del Océano Pacífico en el género *Schedophilus*, como una especie nueva *Schedophilus* ***labyrinthicus.*** El holótypo esta en el Museo Nacional de Ciencias Naturales, Ottawa.

Biographical Note

Don E. McAllister
Don E. McAllister, Curator of Fishes at the National Museum of Natural Sciences, Ottawa, since 1958, is also a lecturer at the University of Ottawa. He was born in Victoria, B.C. and received his Ph.D. from the University of British Columbia in 1964. His studies have taken him to such places as Newfoundland, Quebec, the Northwest Territories, British Columbia, and Japan. He has published over 65 scientific papers, including studies on Arctic fishes, sculpins, smelts, fishes found in archaeological sites, light organs in fishes, the classification of bony fishes, and a popular guide, *The Freshwater Sport Fishes of Canada*. His professional memberships include the Canadian Society of Wildlife and Fishery Biologists and the American Society of Ichthyologists and Herpetologists. His hobbies include photography, skin diving, cross-country skiing and bonsai.

John E. Randall
John E. Randall has been an ichthyologist with the Bernice P. Bishop Museum, Honolulu, Hawaii, since 1966. He was born in Los Angeles in 1924, did his undergraduate work at the University of California, Los Angeles, and received his Ph.D. at the University of Hawaii in 1955. A Yale University–Bishop Museum fellowship enabled him to spend more than a year in ecological research on fishes in Tahiti. From 1957 to 1965, he worked for the University of Miami, spending from 1963 to 1965 directing a marine biological survey of St. John, Virgin Islands. From 1961 to 1965, he was a professor of biology at the University of Puerto Rico; from 1962 he also served as Director of the University's Institute of Marine Biology. He has published over 130 articles, chiefly on the systematics and biology of tropical marine fishes.

Acknowledgements

The authors are grateful to Dr. Ian A. Efford of the University of British Columbia for making the specimens from the Canadian Expedition to Easter Island available for study. Dr. Per Pethon of the Universitet i Oslo kindly provided counts and measurements on the holotype of *Seriolella christopherseni.* Staff of the British Museum (Natural History) assisted Dr. Don E. McAllister during his visit to examine specimens. Dr. M. Stehmann, Institut für Seefischerei, Hamburg, generously made his and Dr. W. Lenz's manuscript available prior to publication. Drs. Frederick H. Berry and William D. Anderson, Jr., of Charleston, South Carolina, permitted reference to their undescribed new species from the Pacific coast of Costa Rica. Dr. Richard L. Haedrich of Woods Hole Oceanographic Institution and C. G. Gruchy of the National Museum of Natural Sciences, Ottawa, criticized the manuscript. Charles H. Douglas made the drawing. T. A. Willock, J. Aniskowicz and the late W. H. Van Vliet took X rays of the specimens. The National Geographic Society provided financial support for the collections made by Dr. John E. Randall.

Introduction

The centrolophid genus *Schedophilus* Cocco, 1839 (*sensu* Haedrich and Horn 1972; Stehmann and Lenz 1972) is known from the waters of the North and South Atlantic, South Africa, the southern Indian Ocean, southeast Asia, Australia, and New Zealand (Haedrich and Horn 1972). This paper reports on the first specimens of an undescribed species of *Schedophilus* from Easter Island (Isla de Pascua), a Chilean territory, and Rapa Iti Island, a French territory, in the South Pacific Ocean. Haedrich (1967), Haedrich and Horn (1969, 1972) and Stehmann and Lenz (1972) treat the systematics of *Schedophilus*.

Drs. Ian A. Efford and John A. Mathias collected two specimens of *Schedophilus* on the 1964–65 Canadian Medical Expedition to Easter Island. One specimen, the holotype, lacks half the caudal fin; the other, a paratype, has two deep cuts in the nape. Aside from frayed fins and some lost scales, these two specimens are in satisfactory condition. Two other specimens in good condition, one from Easter Island, the other from Rapa Iti Island, were obtained by Dr. John E. Randall.

Taxonomy

ORDER PERCIFORMES
SUBORDER STROMATEOIDEI
FAMILY CENTROLOPHIDAE
GENUS *Schedophilus* Cocco, 1839
Schedophilus ***labyrinthicus*** n.sp., Figure 1

Holotype
NMC67–501: 502 mm in standard length; from an unascertained locality near Easter Island; obtained from islanders by Ian A. Efford and Jack A. Mathias, 22 December 1964; deposited in the ichthyological collection, National Museum of Natural Sciences, Ottawa.

Paratypes
BC65–411: 477 mm in standard length; from Hanga Pico, Easter Island; collected by Ian A. Efford and Jack A. Mathias; deposited in the ichthyological collection of the Institute of Animal Resource Ecology, University of British Columbia, Vancouver.
BPBM 6642: 525 mm in standard length; from Easter Island, in about 170 fathoms; obtained from fisherman by John E. Randall, 11 February 1969; deposited in the Bernice P. Bishop Museum, Honolulu, Hawaii.

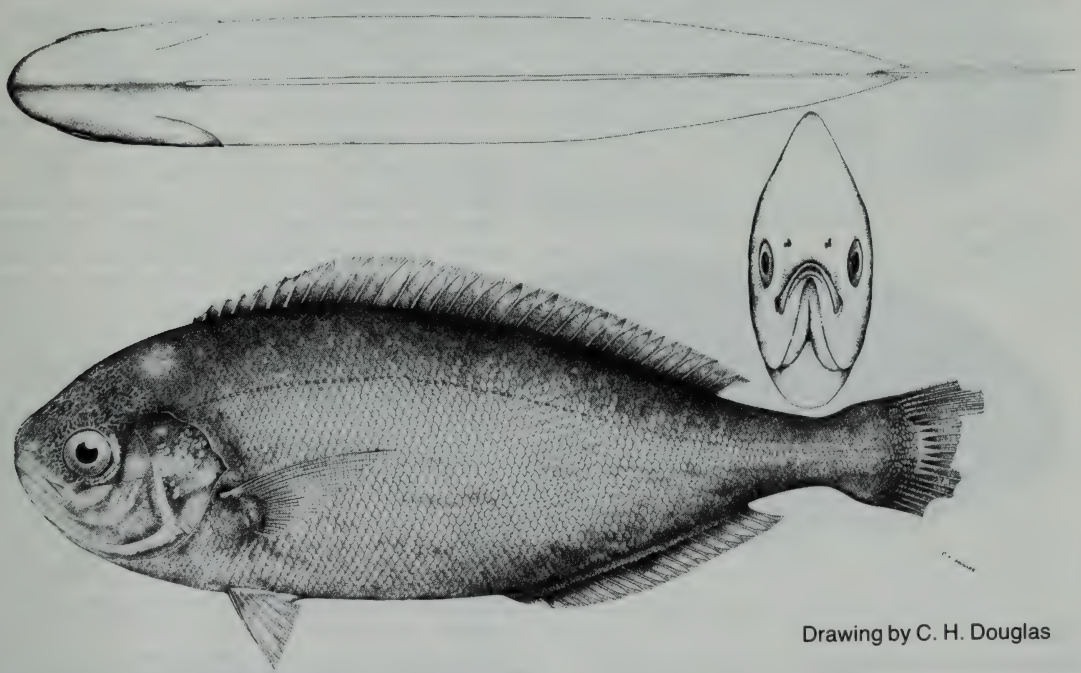

Figure 1
Lateral, dorsal and frontal views of the holotype of *Schedophilus* ***labyrinthicus*** n. sp. Caudal fin restoration from University of British Columbia paratype. The upper two rays of the pectoral are broken.

Figure 2

Schedophilus ***labyrinthicus*** n. sp. *Top:* holotype. *Centre:* University of British Columbia Easter Island paratype 65–411 and Bishop Museum Easter Island paratype 7323. *Bottom:* Bishop Museum Rapa Iti Island specimen 12253. Note larger, more ovate eyes of the two bottom specimens. (Photographs by T. A. Willock and Don E. McAllister)

Other material
BPBM 12253: 512 mm in standard length; from Rapa Iti Island; collected by Alfred Make, March–August 1971: deposited in the Bernice P. Bishop Museum, Honolulu, Hawaii.

Diagnosis
Orbit 20–26 per cent of head length; snout 7–8 per cent and snout to anus 53–54 per cent of standard length; gill rakers comprising .68–.83 of longest gill filament; dorsal spines VII–VIII; dorsal rays 26–29; anal rays 18–19; vertebrae (abdominal + caudal) 10+15; pyloric caeca 4–8; digitiform; scales slightly deciduous; dorsal spines becoming longer posteriorly and graduating into the soft dorsal rays (last spine about 2/3 length of first soft ray); 2 free interneurals.

Description
In counts and proportions below, the holotype is mentioned first, the University of British Columbia paratype next, and the Bishop Museum paratype 6642 and specimen 12253 next.

Dorsal spines and rays, VII,27, VII,27, VIII, 26, VII,29; anal, III,19, III,19, III,18*, III,18; ventral, 1,5, 1,5, 1,5, 1,5; pectoral, i21, i22, i21, i20; pored lateral line scales, ca. 96, ca. 92, ca. 91, ca. 96; scales above the lateral line, 20, 21, 21, 20; scales below the lateral line, 38, —, 37, 37; branchiostegals, 7, 7, 7, 7; gill rakers, 7+1+16, 7+1+17, 7+1+18, 7+1+16; vertebrae (abdominal + caudal), 10+15, 10+15, 10+15, 10+15 (including urostyle).

Head short, snout blunt and almost vertical, head length 3.8, 3.6, 3.4, 3.5 in standard length. Jaws short, extending to just under front edge of orbit, but with gape not reaching orbit. Upper jaw lacking frenum, slightly protractile, with supramaxillary. Angle of jaws about 35° to horizontal axis in holotype. Single row of small teeth in each jaw; palate and floor of mouth toothless. Well-developed flexible teeth on pharyngeal bones above and below. Orbit slightly or very oval, with longest axis vertical; horizontal diameter 4.7, 5.0, 4.1, 3.9, in head length. Preoperculum denticulate at and above angle, jutting posteriorly up to ½ orbit diameter. Interoperculum and lower subopercular finely denticulate. Lower jaw, preoperculum, cheek, snout, and top of head posterior to the nape, with lateral line network opening to surface through numerous tiny pores. Gill rakers slender, toothed on dorsal edge; length of longest is .75, .68, .83, .75 of longest gill filament. Cheek, interoperculum, and operculum with scales.

Spinous dorsal begins ½ orbit diameter in front of end of operculum; spines graduated, lower than rayed dorsal but continuous with it. Rayed dorsal ends in front of end of rayed anal. Pectoral long, falcate, almost reaching to above vent. Pelvics shorter than pectorals, attached to abdomen by a short membrane and folding into shallow groove, origin about 4 mm posterior of a vertical through the pectoral origin. Anal and dorsal spines stiff, stout, first spine buried in skin. Caudal peduncle slender. Caudal fin well-forked. Vent in a shallow groove, its centre about 28 mm anterior to origin of anal fin, slightly behind midpoint of body in the holotype. Scales moderate sized, cycloid, extending onto base of fins, cheek, operculum and isthmus, not highly deciduous. In the holotype and the Bishop Museum 7323 (Figure 2) the lateral line follows the dorsal profile and straightens out horizontally on the urosome above the posterior quarter of the anal fin; due to twisting of the urosome the latter feature cannot be determined on the U.B.C. paratype. Pyloric caeca large, digitiform, 8, 6, 4, 7. All specimens have two free interneurals before the dorsal fin. Preserved colour dark brown dorsally, yellowish below. Fins without dark markings. Buccal and branchial cavities light. Peritoneum light with fine speckling. The eye coloration is visible only in the Bishop Museum 7323, where its iris is golden, appearing as a complete ring undivided by a bar.

Etymology
The specific name *labyrinthicus* is derived from the Greek λαβυρινθος, or maze, in reference to the labyrinthine complex of the cephalic lateral-line sensory system.

* An X ray shows one ray missing, so the anal count is given as III,18, rather than the apparent III,17.

Discussion

Stehmann and Lenz (1972) have recharacterized the *Schedophilus ovalis* species-group as having two free predorsal interneurals as opposed to three in the others of the genus and in the related genera *Seriolella* and *Hyperoglyphe*. We follow these authors in the generic assignment of the Easter and Rapa Iti specimens to *Schedophilus*.

The Easter and Rapa Iti specimens can be immediately distinguished from several other species in the genus by their fewer vertebrae. *Schedophilus huttoni* (Waite, 1910) from New Zealand and Australia has 12+18–19, *S. griseolineatus* (Norman, 1937) from off Argentina has 10+16 (and numerous pyloric caeca), and *S. maculatus* Günther, 1860, from the Southern Ocean has 12+17 (counts from Haedrich and Horn 1972), whereas the Easter and Rapa Iti specimens have only 10+15 vertebrae. *S. medusophagus* Cocco, 1839, from the Mediterranean and North Atlantic is sharply distinguished from our specimens by possession of 44–50 dorsal elements (spines and rays) as opposed to 34–36, *S. pemarco* (Poll, 1959) by its 12–14 as opposed to 16–18 gill rakers on the lower gill arch and its lower dorsal and anal ray counts, *S. haedrichi* Chirichigno, 1973, by its fewer dorsal rays, 22–23, as opposed to 26–29, fewer anal rays, 15–16, as opposed to 18–19, and its longer pre-anal and head lengths (Chirichigno 1973). Our species differs from an undescribed new species of the genus from the Pacific coast of Costa Rica by its fewer dorsal elements IV,22 as opposed to VI–VII,26–29, fewer anal elements III,15 as opposed to III,18–19, and 3 free interneurals as opposed to 2 (F. H. Berry and W. D. Anderson, Jr., MS).

Of the currently accepted forms in the genus, this leaves only the *Schedophilus ovalis* complex. Stehmann and Lenz (1972) synonymized *S. christopherseni* (Sivertsen 1946) from Tristan da Cunha, and suggested the probable synonymy of *S. velaini* (Sauvage 1879) of St. Paul Island in the southernmost Indian Ocean, and the Easter and Rapa Iti islands material with *S. ovalis* (Valenciennes, in Cuvier and Valenciennes 1833), which was originally described from the Mediterranean and extended by later authors to the eastern and central Atlantic. However, noting certain patterns in the data, we place a different interpretation on them. The 12 specimens of *S. ovalis* in the Mediterranean, central and eastern Atlantic in the Northern Hemisphere for which we have data (BMNH 1953.11.1.529, Figure 3; BMNH 1955.19–19.317; BMNH 1925.1.8.3; an unnumbered BMNH Madeiran specimen; plus data in Stehmann and Lenz 1972; Steindachner 1868; Cuvier and Valenciennes 1833) have 21–23 anal rays and 5–6(7) gill rakers on the upper arch, whereas all specimens known from the Southern Hemisphere (St. Paul, Tristan da Cunha, Easter, and Rapa Iti islands) have 18–20 anal rays and 6–7 gill rakers on the upper arch. Further, the Northern Hemisphere specimens are deeper, the depth comprising .34–.42 of standard length as opposed to .29–.35 for the Southern Hemisphere specimens and the caudal peduncle depth being .098–.121 as opposed to .078–.090 of the standard length. The northern specimens range from 144 to 452 mm in standard length, whereas the southern ones range from 477 to 525 mm in standard length. It is possible, therefore, that the proportional differences may be

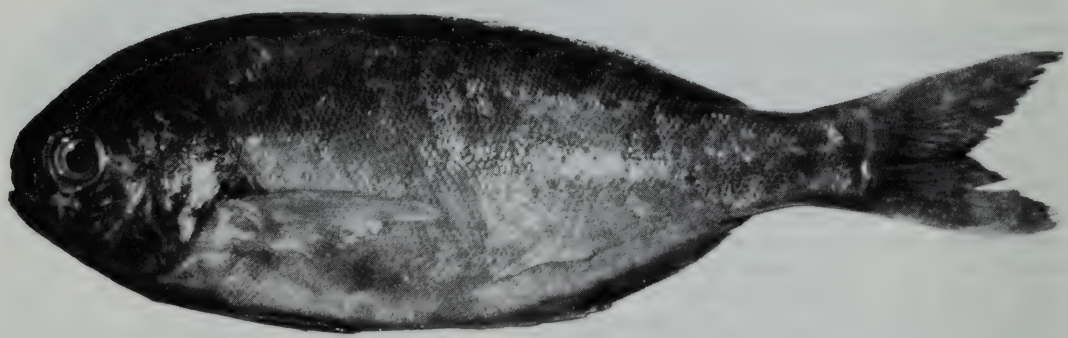

Figure 3

Schedophilus ovalis (Valenciennes), BMNH 1953.11.1.529, from Funchal market, Madeira. Note the deeper body and caudal peduncle. (Photograph by Don E. McAllister)

attributable to negative allometric growth, although it seems odd that the northern ones should all be smaller than the southern ones. The meristic differences remain, however.

Stehmann and Lenz (1972) suggest that, since the meristic variation in the better-known *Seriolella punctata* (45 specimens) equals or exceeds that amongst the various *Schedophilus ovalis* samples (*sensu lato*, 16 specimens), the latter complex should be regarded as conspecific. Although the logic is not impeccable, the argument is persuasive. To apply the limits of variation of one genus to another, even though the fishes are closely related, may not always be justified. More importantly, it overlooks the geographical pattern in the data, northern populations with 21–23 anal rays, and southern with 18–20. Chi-square tests, with and without Yates correction, show the Northern Hemisphere specimens to be significantly different from the Southern Hemisphere specimens at the $p = <.001$ level. We conclude, therefore, that the name *Schedophilus ovalis* (Valenciennes) should be applied only to those populations of *Schedophilus* in the warmer waters of the central and eastern Atlantic Ocean and the Mediterranean Sea that have 10+15 vertebrae and 21–23 anal rays.

This leaves us with three allopatric populations in the Southern Hemisphere whose status must be discussed: the Tristan da Cunha *S. christopherseni*, the St. Paul *S. velaini*, and the Easter and Rapa Iti islands populations. The standard lengths of the samples are 505 mm, 550 mm, and 477–525 mm respectively. Unlike the Easter and Rapa Iti specimens, both *S. christopherseni* and *S. velaini* have 20 anal rays instead of 18–19 and an orbit to snout ratio of 1.14–1.16 instead of .70–1.00. Further, *S. christopherseni* has 6 dorsal spines instead of 7 or 8, only 85 pored lateral-line scales instead of 91–96, and rounded instead of pointed tips to the caudal fin lobes. *S. velaini* has a crescentic anal fin, with the first soft ray twice the length of the last as opposed to 1.5 times, or less, the length of the last soft ray in the Easter and Rapa Iti material. *S. christopherseni* and *S. velaini* appear morphologically similar, and both inhabit oceanic islands near the northern limit of drift ice and within the seasonal oscillation of the Antiboreal Convergence (Ekman 1953). Easter and Rapa Iti islands, on the other hand, are 900 and 1400 miles respectively beyond the northern limit of drift ice and over 600 miles north of the Antiboreal Convergence. The Easter and Rapa Iti populations, therefore, appear morphologically and ecologically distinct from *S. velaini* and *S. christopherseni* and are here recognized as a new species, *Schedophilus labyrinthicus*.

The four specimens of *Schedophilus labyrinthicus* are fairly homogeneous with respect to meristic and most mensural characteristics, but the Bishop Museum paratype from Easter Island does differ in having a larger orbit (4.1 instead of 4.9–5.0 in head) and a larger head (3.4 instead of 3.6–3.8 in standard length). The specimen from Rapa Iti Island differs most in having the snout less declivous, 29 instead of 26–27 soft dorsal rays and the orbit diameter 3.9 instead of 4.1–5.0 in head; it is most like the Bishop Museum Easter Island paratype. Because of these differences we do not give the Rapa Iti specimen paratype status. We were struck by the variation in shape as well as by the size of the orbits. The left orbit is small and circular in the holotype and in the U.B.C. paratype, large and subcircular in the Bishop Museum Easter Island specimen, and large and ovate in the Rapa Iti specimen. However, the contralateral orbit of the Bishop Museum Easter Island specimen is ovate, that of the Rapa Iti specimen is large and oval, yielding orbit into head proportions for left and right orbits of 4.1 and 3.8 for the Bishop Museum Easter Island specimen and 3.9 and 3.4 for the Rapa Iti specimens (based on maximum dimension). Because of the bilateral variation in individual specimens, we do not wish at the moment to over-emphasize the differences from specimen to specimen, although, in the future, additional material may reinforce the significance of such differences. We also noted variation in orbit shape of *Schedophilus ovalis* (*sensu stricto*). The left orbit of BMNH 1953.11.1.529 was small and circular while that of BMNH 1955.19–19.317 was large and oval (both from Madeira).

An ophichthid eel about 295 mm in total length was found in the body cavity between the gut and gas bladder of the Rapa Iti specimen. The eel was bent in a U-shaped position, and appeared to be enclosed in a membrane. As its coloration was normal, it would appear to have burrowed out of the stomach before digestion began. Walters (1955) discussed other examples of ophichthid eels found in the coelomic cavity of predacious fishes; he called them pseudo-parasites. The Rapan name for *Schedophilus* is "paipai".

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Table 1
Measurements of *Schedophilus* ***labyrinthicus*** n. sp., in millimetres/hundredths of standard length

	Holotype Easter Is. NMC67-501	Paratype Easter Is. BC65-411	Paratype Easter Is. BPBM6642	Rapa Iti Is. BPBM12253
Standard length	502/100	477/100	525/100	512/100
Greatest body depth	170/34	158/33	162/31	150/29
Head length	132/26	131/28	155/30	148/29
Snout to centre of anus	269/54	251/53	277/53	277/54
Pelvic fin to anal origin	156/31	119/25[a]	151/29	141/28
Horizontal orbit diameter	28/6	26/6	38/7	38/7
Snout length	37/7	37/8	39/8	38/7
Upper-jaw length	45/9	43/9	52/10	49/10
Pectoral-fin length	108+/22+[b]	114+/24+[b]	136/26	128/25
Pelvic-fin length	58/12	65/14	66/12	64/12
Caudal-peduncle depth	39/8	42/9	46/9	46/9
Caudal-peduncle length	89/18	86/18	83/16	75/15
Caudal-fin length	–	112/23	–	–
Longest gill raker	17/3	14/3	19/4	17/3
Longest gill filament	22/4	20/4	22/4	23/4

[a] Foreshortened by contraction following cutting of nape muscles.
[b] Tips of pectorals of both specimens broken off.

Errata

The last sentence on page 4, column 1, should read:

An undescribed new species of the genus from the Pacific coast of Costa Rica differs from our species by its fewer dorsal elements IV,22 as opposed to VI–VII,26–29, fewer anal elements III,15 as opposed to III,18–19, and 3 free interneurals as opposed to 2 (F. H. Berry and W. D. Anderson, Jr., MS).

Where it appears on pages 2 and 3, BPBM 7323 should read:
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